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Security Council

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Letter dated 1 June 2001 from the Executive Chairman of the United Nations Monitoring, Verification and Inspection Commission addressed to the President of the Security Council

In paragraph 19 of its resolution 1330 (2000), the Security Council reiterated its request in paragraph 8 of resolution 1284 (1999) to the Executive Chairman of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) and to the Director General of the International Atomic Energy Agency to complete by the end of this period the revision and updating of the lists of items and technology to which the import/export mechanism approved by resolution 1051 (1996) applies.

Paragraph 26 of the Special Commission's plan for ongoing monitoring and verification (S/22871/Rev.1), approved by the Security Council in its resolution 715 (1991), provides that the Special Commission could, after informing the Security Council, update and revise the annexes in the light of information and experience gained in the course of the implementation of resolution 687 (1991) and 707 (1991) and of the plan.

In paragraph 9 of its resolution 1051 (1996), the Security Council provides that the lists may be amended in accordance with the plans, after appropriate consultations with interested States and, as laid down in the plans, after notification to the Council.

In accordance with the above requirements, UNMOVIC held a series of consultations with interested States. Consultations on the lists of chemical and biological items took place on 13 and 14 February and 8 and 9 May 2001. Consultations on the missile-related list took place on 25 April 2001.

For the purposes of the notification to the Security Council, as provided in its resolution 1051 (1996), I am transmitting herewith the revised lists of chemical-, biological- and missile-related items subject to notification under the resolution (see annex).

I would be most grateful if you would bring the present letter, together with the revised lists, to the attention of the members of the Council.

(*Signed*) Hans **Blix**

01-40616 (E) 210601

Annex

1 June 2001

Revised Annex II of the Plan for ongoing monitoring and verification

Items to be notified under the Export / Import Mechanism approved by SCR1051

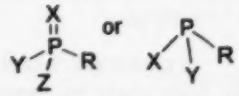
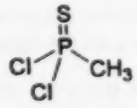
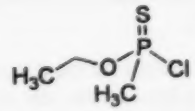
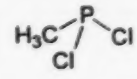
Provisions related to Chemical Items

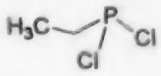
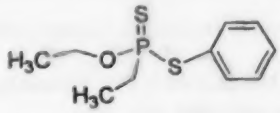
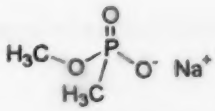
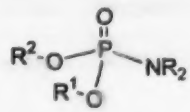
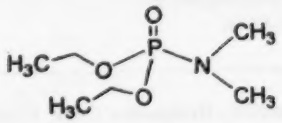
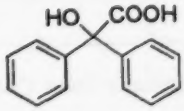
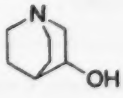
1. The following list (List A) contains chemicals capable of being used for the development, production or acquisition of chemical weapons, but which also are usable for purposes not prohibited by resolution 687 (1991) and, therefore, are subject to notification under the Export/Import monitoring mechanism for Iraq approved by Security Council resolution 1051 (1996). For the purposes of this annex the chemicals listed include their chemical forms and mixtures.

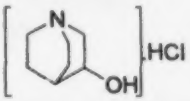
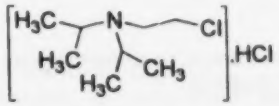
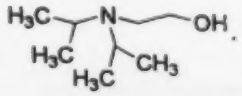
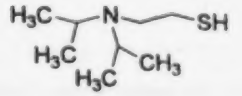
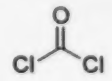
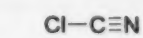
Note:
All mixtures which contain two or more chemicals from List A in any percentage, are subject to notification, but mixtures that contain less than 10% (weight/weight; on a solvent free basis) of only one chemical of List A are exempted.

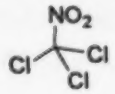
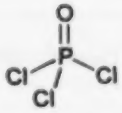
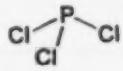
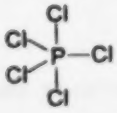
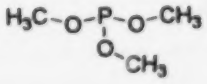
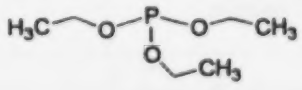
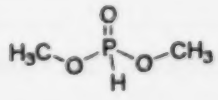
The term chemical forms means all stereoisomers, allotropes or isotopes of the chemical in any physical state (for example gaseous, liquid, solid, solvated, powdered etc).

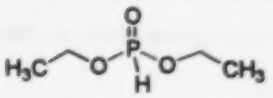
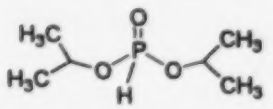
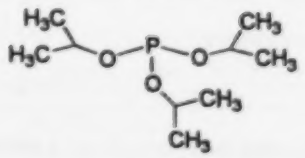
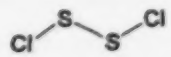
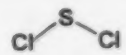
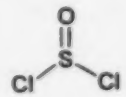
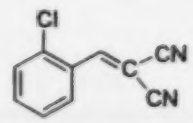
List A: Dual-Use Chemicals Requiring Notification

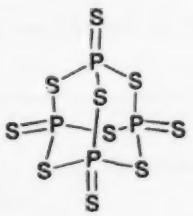
ITEM	STRUCTURE
A.01 (Commodity Designator Code: CA000A01) Chemicals, except those specified in list B of this annex, containing a phosphorus atom to which is bonded one alkyl group but no further carbon atoms.	 where R = C_nH_{2n+1} $n \geq 1$ and X, Y, Z = any atom or group for which the atom directly bonded to the central phosphorus atom is not carbon
for example: Methylphosphonothioic dichloride [CAS No. 676-98-2]	
for example: O-Ethyl methylphosphonothioic chloride [CAS No. 2524-16-5]	
for example: Methylphosphonous dichloride [CAS No. 676-83-5]	

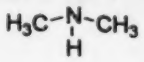
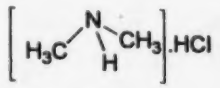
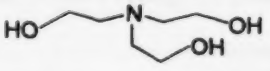
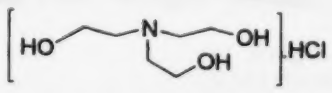
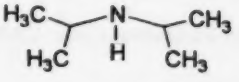
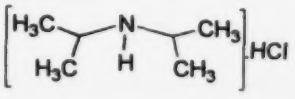
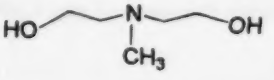
ITEM	STRUCTURE
for example: Ethylphosphonous dichloride [CAS No. 1498-40-4]	
for example: O-Ethyl S-phenyl ethylphosphonothiolothionate [CAS No. 944-22-9] (also known as: Fonofos)	
for example: Methylphosphonic acid, monomethyl ester, sodium salt. [CAS No. 73750-69-3]	
A.02 (Commodity Designator Code: CA000A02) Dialkyl (Me, Et, n-Pr or i-Pr) N,N-dialkyl (Me, Et, n-Pr or i-Pr)-phosphoramidates	 where R, R^1, R^2 = C_nH_{2n+1} n = 1-3
for example: Diethyl N,N-dimethylphosphoramidate [CAS No. 2404-03-7]	
A.03 (Commodity Designator Code: CA000A03) Arsenic trichloride [CAS No. 7784-34-1]	$AsCl_3$
A.04 (Commodity Designator Code: CA000A04) 2,2-Diphenyl-2-hydroxyacetic acid [CAS No. 76-93-7] (also known as: benzilic acid)	
A.05 (Commodity Designator Code: CA000A05) Quinuclidin-3-ol [CAS No. 1619-34-7] and corresponding protonated salts	

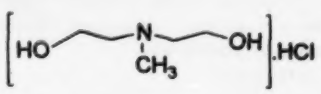
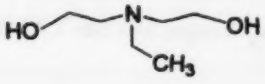
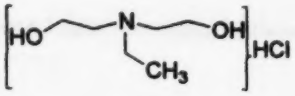
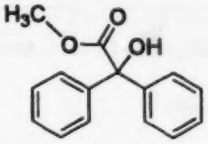
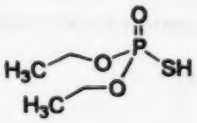
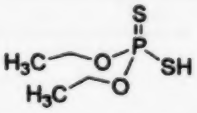
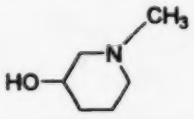
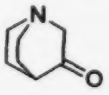
ITEM	STRUCTURE
for example: Quinuclidin-3-ol hydrochloride [CAS No. 6238-13-7]	
A.06 (Commodity Designator Code: CA000A06) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethyl-2-chloride and corresponding protonated salts	 where R = C_nH_{2n+1} n = 1-3
for example: 2-(Diisopropylamino)ethyl chloride hydrochloride [CAS No. 4261-68-1]	
A.07 (Commodity Designator Code: CA000A07) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-ol and corresponding protonated salts	 where R = C_nH_{2n+1} n = 1-3
for example: 2-(Diisopropylamino)ethanol [CAS No. 96-80-0]	
A.08 (Commodity Designator Code: CA000A08) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) aminoethane-2-thiol and corresponding protonated salts	 where R = C_nH_{2n+1} n = 1-3
for example: 2-(Diisopropylamino)ethanethiol [CAS No. 5842-07-9]	
A.09 (Commodity Designator Code: CA000A09) Phosgene [CAS No. 75-44-5] (also known as: carbonyl dichloride)	
A.10 (Commodity Designator Code: CA000A10) Cyanogen chloride [CAS No. 506-77-4]	

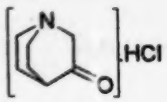
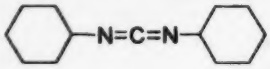
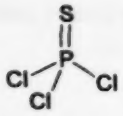
ITEM	STRUCTURE
A.11 (Commodity Designator Code: CA000A11) Hydrogen cyanide [CAS No. 74-90-8]	HCN
A.12 (Commodity Designator Code: CA000A12) Trichloronitromethane [CAS No. 76-06-2] (also known as: chloropicrin)	
A.13 (Commodity Designator Code: CA000A13) Phosphorus oxychloride [CAS No. 10025-87-3]	
A.14 (Commodity Designator Code: CA000A14) Phosphorus trichloride [CAS No. 7719-12-2]	
A.15 (Commodity Designator Code: CA000A15) Phosphorus pentachloride [CAS No. 10026-13-8]	
A.16 (Commodity Designator Code: CA000A16) Trimethyl phosphite [CAS No. 121-45-9]	
A.17 (Commodity Designator Code: CA000A17) Triethyl phosphite [CAS No. 122-52-1]	
A.18 (Commodity Designator Code: CA000A18) Dimethyl phosphite [CAS No. 868-85-9] (also known as: dimethyl phosphonate; dimethyl hydrogen phosphite)	

ITEM	STRUCTURE
A.19 (Commodity Designator Code: CA000A19) Diethyl phosphite [CAS No. 762-04-9] (also known as: diethyl phosphonate)	
A.20 (Commodity Designator Code: CA000A20) Diisopropyl phosphite [CAS No. 1809-20-7] (also known as: diisopropyl phosphonate)	
A.21 (Commodity Designator Code: CA000A21) Triisopropyl phosphite [CAS No. 116-17-6]	
A.22 (Commodity Designator Code: CA000A22) Sulphur monochloride [CAS No. 10025-67-9]	
A.23 (Commodity Designator Code: CA000A23) Sulphur dichloride [CAS No. 10545-99-0]	
A.24 (Commodity Designator Code: CA000A24) Thionyl chloride [CAS No. 7719-09-7]	
A.25 (Commodity Designator Code: CA000A25) Hydrogen fluoride [CAS No. 7664-39-3]	HF
A.26 (Commodity Designator Code: CA000A26) ortho-Chlorobenzylidene malononitrile [CAS No. 2698-41-1] (also known as: CS)	

ITEM	STRUCTURE
A.27 (Commodity Designator Code: CA000A27) Potassium fluoride [CAS No. 7789-23-3]	KF
A.28 (Commodity Designator Code: CA000A28) Ammonium bifluoride [CAS No. 1341-49-7]	$NH_4F.HF$
A.29 (Commodity Designator Code: CA000A29) Sodium bifluoride [CAS No. 1333-83-1]	NaF.HF
A.30 (Commodity Designator Code: CA000A30) Sodium fluoride [CAS No. 7681-49-4]	NaF
A.31 (Commodity Designator Code: CA000A31) Potassium bifluoride [CAS No. 7789-29-9]	KF.HF
A.32 (Commodity Designator Code: CA000A32) Sodium sulphide [CAS No. 1313-82-2]	Na_2S
A.33 (Commodity Designator Code: CA000A33) Phosphorus pentasulphide [CAS No. 1314-80-3]	P_2S_5 exists as: 
A.34 (Commodity Designator Code: CA000A34) Chloroethanol [CAS No. 107-07-3]	

ITEM	STRUCTURE
A.35 (Commodity Designator Code: CA000A35) Dimethylamine [CAS No. 124-40-3] and corresponding protonated salts	
for example: Dimethylamine hydrochloride [CAS No. 506-59-2]	
A.36 (Commodity Designator Code: CA000A36) Potassium cyanide [CAS No. 151-50-8]	KCN
A.37 (Commodity Designator Code: CA000A37) Sodium cyanide [CAS No. 143-33-9]	NaCN
A.38 (Commodity Designator Code: CA000A38) Triethanolamine [CAS No. 102-71-6] and corresponding protonated salts	
for example: Triethanolamine hydrochloride [CAS No. 637-39-8]	
A.39 (Commodity Designator Code: CA000A39) Diisopropylamine [CAS No. 108-18-9] and corresponding protonated salts	
for example: Diisopropylamine hydrochloride [CAS No. 819-79-4]	
A.40 (Commodity Designator Code: CA000A40) Methyl diethanolamine [CAS No. 105-59-9] and corresponding protonated salts	

ITEM	STRUCTURE
for example: Methyl diethanolamine hydrochloride [CAS No. 54060-15-0]	
A.41 (Commodity Designator Code: CA000A41) Ethyl diethanolamine [CAS No. 139-87-7] and corresponding protonated salts	
for example: Ethyl diethanolamine hydrochloride [CAS No. 58901-15-8]	
A.42 (Commodity Designator Code: CA000A42) Methyl benzilate [CAS No. 76-89-1]	
A.43 (Commodity Designator Code: CA000A43) O,O-Diethyl phosphorothioate [CAS No. 2465-65-8]	
A.44 (Commodity Designator Code: CA000A44) O,O-Diethyl phosphorodithioate [CAS No. 298-06-6]	
A.45 (Commodity Designator Code: CA000A45) Ethylene oxide [CAS No. 75-21-8]	
A.46 (Commodity Designator Code: CA000A46) 3-Hydroxy-1-methylpiperidine [CAS No. 3554-74-3] and corresponding protonated salts	
A.47 (Commodity Designator Code: CA000A047) 3-Quinuclidone [3731-38-2] and corresponding protonated salts	

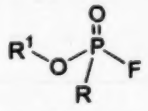
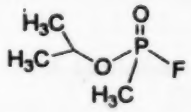
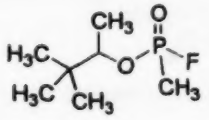
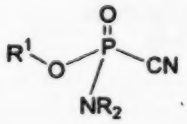
ITEM	STRUCTURE
for example: 3-Quinuclidone hydrochloride [CAS No. 1193-65-3]	
A.48 (Commodity Designator Code: CA000A48) Phosphorus [CAS No. 7723-14-0]	P
A.49 (Commodity Designator Code: CA000A49) Fluorine [CAS No. 7782-41-4]	F_2
A.50 (Commodity Designator Code: CA000A50) Dicyclohexylcarbodiimide [CAS No. 538-75-0]	
A.51 (Commodity Designator Code: CA000A51) Thiophosphoryl Chloride [CAS No. 3982-91-0] (also known as: Phosphorus sulphochloride)	

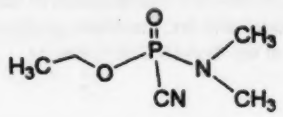
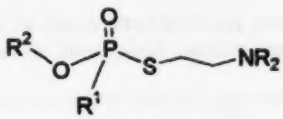
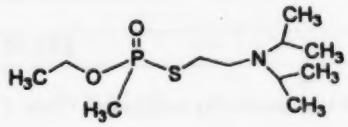
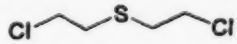
2. The following list (List B) contains chemicals that have little or no use except as chemical warfare agents or for the development, production or acquisition of chemical weapons, or which have been used by Iraq as essential precursors for chemical weapons and are, therefore, prohibited to Iraq, save under the procedure for special exceptions provided for in paragraph 32 of the Plan (S/22871/Rev.1).

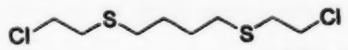
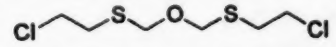
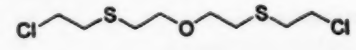
Note:
For the purposes of this annex the chemicals listed include their chemical forms and mixtures in any percentage save under the procedure for special exceptions provided for in paragraph 32 of the Plan.

The term chemical forms means all stereoisomers or isotopes of the chemical in any physical state (for example gaseous, liquid, solid, solvated, powdered etc).

List B – Normally Prohibited Chemicals [except under paragraph 32 of the Plan (S/22871/Rev.1; 1991)]

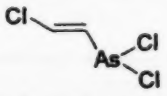
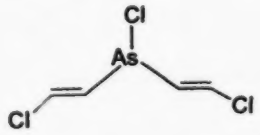
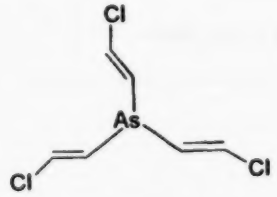
ITEM	STRUCTURE
B.01 (Commodity Designator Code: CA000B01) O-Alkyl ($\leq C_{10}$, including cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr) phosphonofluoridates	 where R = C_nH_{2n+1} n = 1-3 and R^1 = $\leq C_{10}$, including cycloalkyl
for example: O-Isopropyl methylphosphonofluoridate [CAS No. 107-44-8] (also known as: Sarin; GB)	
for example: O-Pinacolyl methylphosphonofluoridate [CAS No. 96-64-0] (also known as: Soman; GD)	
B.02 (Commodity Designator Code: CA000B02) O-Alkyl ($\leq C_{10}$- including cycloalkyl) N,N-dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidocyanidates	 where R = C_nH_{2n+1} n = 1-3 and R^1 = $\leq C_{10}$, including cycloalkyl

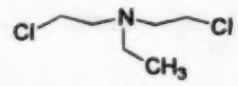
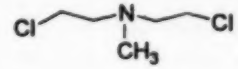
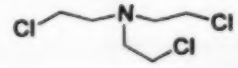
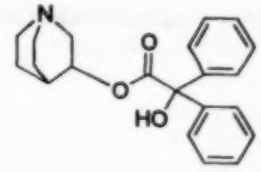
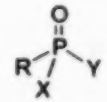
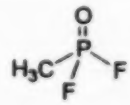
ITEM	STRUCTURE
for example: O-Ethyl N,N-dimethylphosphoramidocyanidate [CAS No. 77-81-6] (also known as: Tabun; GA)	
B.03 (Commodity Designator Code: CA000B03) O-Alkyl (H or $\leq C_{10}$, including cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr) aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonothiolates or corresponding alkylated and protonated salts	 where R, $R^1 = C_nH_{2n+1}$ n = 1-3 and R^2 = H or $\leq C_{10}$, including cycloalkyl
for example: O-Ethyl S-[2-(diisopropylamino)ethyl] methylphosphonothiolate [CAS No. 50782-69-9] (also known as: VX)	
B.04 (Commodity Designator Code: CA000B04) <u>Sulphur mustards</u>:	
for example: 2-Chloroethylchloromethylsulphide [CAS No. 2625-76-5]	
for example: Bis(2-chloroethyl)sulphide [CAS No. 505-60-2] (also known as: Sulphur Mustard; H)	
for example: Bis(2-chloroethylthio)methane [CAS No. 63869-13-6]	
for example: 1,2-Bis(2-chloroethylthio)ethane [CAS No. 3563-36-8] (also known as: Sesquimustard; Q)	

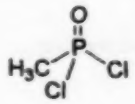
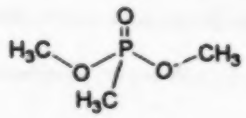
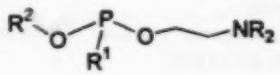
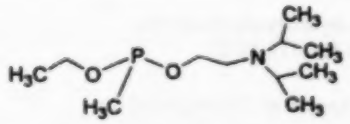
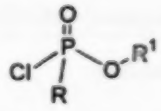
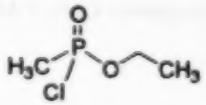
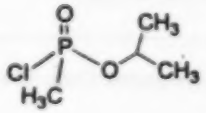
ITEM	STRUCTURE
for example: 1,3-Bis(2-chloroethylthio)-n-propane [CAS No. 63905-10-2]	
for example: 1,4-Bis(2-chloroethylthio)-n-butane [CAS No. 142868-93-7]	
for example: 1,5-Bis(2-chloroethylthio)-n-pentane [CAS No. 142868-94-8]	
for example: Bis(2-chloroethythiomethyl)ether [CAS No. 63918-90-1]	
for example: Bis(2-chloroethylthioethyl)ether [CAS No. 63918-89-8] (also known as: O-mustard; T)	

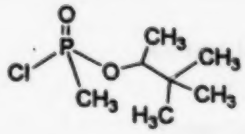
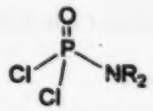
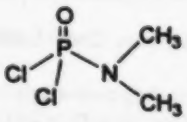
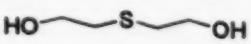
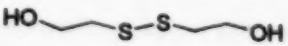
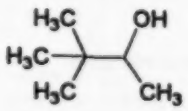
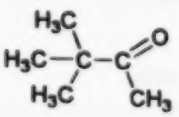
B.05 (Commodity Designator Code: CA000B05)

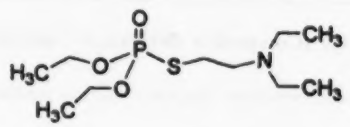
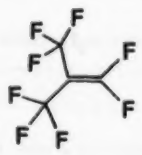
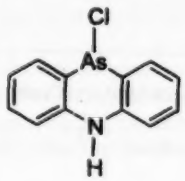
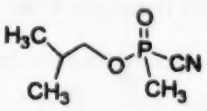
Lewisites:

for example: 2-Chlorovinyldichloroarsine [CAS No. 541-25-3] (also known as: Lewisite 1)	
for example: Bis(2-chlorovinyl)chloroarsine [CAS No. 40334-69-8] (also known as: Lewisite 2)	
for example: Tris(2-chlorovinyl)arsine [CAS No. 40334-70-1] (also known as: Lewisite 3)	

ITEM	STRUCTURE
B.06 (Commodity Designator Code: CA000B06) Nitrogen mustards and their protonated salts:	
for example: Bis(2-chloroethyl)ethylamine [CAS No. 538-07-8] (also known as: HN1)	
for example: Bis(2-chloroethyl)methylamine [CAS No. 51-75-2] (also known as: HN2)	
for example: Tris(2-chloroethyl)amine [CAS No. 555-77-1] (also known as: HN3)	
B.07 (Commodity Designator Code: CA000B07) 3-Quinuclidinyl benzilate [CAS No. 6581-06-2] (also known as: BZ)	
B.08 (Commodity Designator Code: CA000B08) Alkyl (Me, Et, n-Pr or i-Pr) phosphonyldihalides	 where R = C_nH_{2n+1} n = 1-3 and X, Y = halides
for example: Methylphosphonyl difluoride [CAS No. 676-99-3] (also known as: DF; MPF)	

ITEM	STRUCTURE
for example: Methylphosphonyl dichloride [CAS No. 676-97-1] (also known as: DC; MPC)	
B.09 (Commodity Designator Code: CA000B09) Dimethyl methylphosphonate [CAS No. 756-79-6] (also known as: DMMP)	
B.10 (Commodity Designator Code: CA000B10) O-Alkyl (H or ≤C_{10}, including cycloalkyl) O-2-Dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonites and corresponding alkylated salts and protonated salts	 where R, R^1 = C_nH_{2n+1} n = 1-3 and R^2 = H or ≤C_{10}, including cycloalkyl
O-Ethyl O-2-diisopropylaminoethyl methylphosphonite [CAS No. 57856-11-8] (also known as: QL)	
B.11 (Commodity Designator Code: CA000B11) O-Alkyl (≤C_{10}, including cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr) phosphonochloridates	 where R = C_nH_{2n+1} n = 1-3 and R^1 = ≤C_{10}, including cycloalkyl
for example: O-Ethyl methylphosphonchloridate [CAS No. 5284-09-3]	
for example: O-Isopropyl methylphosphonochloridate [CAS No. 1445-76-7] (also known as: Chlorosarin)	

ITEM	STRUCTURE
for example: O-Pinacolyl methylphosphonochloridate [CAS No. 7040-57-5] (also known as: Chlorosoman)	
B.12 (Commodity Designator Code: CA000B12) N,N-Dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidic dihalides	 where R = C_nH_{2n+1} n = 1-3
for example: N,N-dimethylphosphoramidic dichloride [CAS No. 677-43-0]	
B.13 (Commodity Designator Code: CA000B13) Bis(2-hydroxyethyl)sulphide [CAS No. 111-48-8] (also known as: Thiodiglycol)	
B.14 (Commodity Designator Code: CA000B14) Bis(2-hydroxyethyl)disulphide [CAS No. 1892-29-1] (also known as: Dithiodiglycol)	
B.15 (Commodity Designator Code: CA000B15) 3,3-Dimethylbutan-2-ol [CAS No. 464-07-3] (also known as: Pinacolyl alcohol)	
B.16 (Commodity Designator Code: CA000B16) 3,3-Dimethylbutan-2-one [CAS No. 75-97-8] (also known as: Pinacolone)	

ITEM	STRUCTURE
B.17 (Commodity Designator Code: CA000B17) O,O-Diethyl S-[2-(diethylamino)ethyl] phosphorothiolate [CAS No. 78-53-5] and corresponding alkylated and protonated salts (also known as: Amiton)	
B.18 (Commodity Designator Code: CA000B18) 1,1,3,3,3-Pentafluoro-2-(trifluoromethyl)-1-propene [CAS No. 382-21-8] (also known as: PFIB)	
B.19 (Commodity Designator Code: CA000B19) Diphenylaminechloroarsine [CAS No. 578-94-9] (also known as: Adamsite)	
B.20 (Commodity Designator Code: CA000B20) O-Isobutyl methylphosphonocyanidate	

DUAL-USE EQUIPMENT

10.4.1.1 (Commodity Designator Code: CA010411)

Corrosion resistant[1] reactor vessels or reactors with an internal volume of 0.05 m^3 or greater but less than 20 m^3.

Corrosion resistant[1] agitators for use in reactor vessels.

10.4.1.2 (Commodity Designator Code: CA010412)

Corrosion resistant[1] condensers and corrosion resistant[1] heat exchangers with a heat transfer surface area of 0.03 m^2 or greater.

10.4.1.3 (Commodity Designator Code: CA010413)

Corrosion resistant[1] distillation and corrosion resistant[1] absorption columns with an internal diameter of 0.05 m or greater.

10.4.1.4 (Commodity Designator Code: CA010414)

Corrosion resistant[1] scrubbers and corrosion resistant[1] separators for use in scrubbers.

10.4.1.5 (Commodity Designator Code: CA010415)

Corrosion resistant[1] tanks and other storage vessels with an internal volume of 0.05 m^3 or more.

10.4.1.6 (Commodity Designator Code: CA010416)

Sheets made of fluoropolymer or corrosion resistant[1] metal or alloy with a surface area of more than 1 m^2 and a thickness of 4 mm or more.

10.4.2 (Commodity Designator Code: CA010420)

Corrosion resistant[1] multiple-seal, canned drive, magnetic drive, bellows or diaphragm pumps, or progressive cavity tubing pumps (including peristaltic or roller pumps in which only the elastometric tubing is corrosion resistant[1]) with manufacturer's specified maximum flow-rate of 0.01 m^3/minute or greater, under standard temperature (293 K) and standard pressure conditions (101.30 kPa).

Corrosion resistant[1] vacuum pumps with manufacture's specified maximum flow-rate greater than 0.08 m^3/minute under standard temperature (293 K) and pressure (101.3 kPa) conditions.

10.4.3 (Commodity Designator Code: CA010430)

Corrosion resistant[1] conduits (including single and double-walled pipes, towers, columns and tubes) with an inner diameter of 0.05 m or more.

10.4.4 (Commodity Designator Code: CA010440)

Corrosion resistant[1] valves with a smallest inner diameter of 12.5 mm or more.

10.4.5 (Commodity Designator Code: CA010450)

Corrosion resistant[1] remote-controlled filling equipment.

10.4.6 (Commodity Designator Code: CA010460)

Incineration equipment designed for the disposal of toxic chemicals with an average combustion chamber temperature of over 1273 K (1000° C) or with catalytic incineration over 623 K (350° C).

10.4.7 (Commodity Designator Code: CA010470)

Equipment and instruments designed for detecting, measuring or recording directly and near real time (within one minute),
(a) the air concentration of List A dual-use chemicals or toxic organic substances/organic compounds containing the elements chlorine, fluorine, phosphorus or sulphur, with a detection threshold from 0.3 mg/m^3; or
(b) levels of cholinesterase-inhibitors in the air, including specially designed equipment for the detection or identification of chemical warfare agents.

Note: The above entry excludes smoke detectors for household protection.

10.4.8 (Commodity Designator Code: CA010480)

Chemical protection equipment designed for protection against toxic chemicals (as given in UNMOVIC lists A & B) as follows:
(a) external ventilated semi- or full-protection personal suits;
(b) autonomous respirators; and
(c) air filtration equipment using liquid or solid adsorption agent.

Note: The above entry excludes equipment specially designed for fire fighting use and specially designed equipment for use by personnel in emergency evacuation procedures.

Materials encompassed by the term "Corrosion Resistant"

b/ For the purposes of this annex, "corrosion resistant" means where all surfaces that come in direct contact with the chemical(s) being processed are made from the following:

(i) glass (including vitrified or enamelled coatings or glass lining);
(ii) ceramics;
(iii) ferrosilicons;
(iv) titanium or titanium alloys - (some examples: Monel 10, Monel 11, titanium 20, titanium nitride 70, titanium nitride 90);
(v) tantalum or tantalum alloys;
(vi) zirconium or zirconium alloys;
(vii) nickel or alloys with more than 40 per cent nickel by weight - (some examples: Alloy 400, AMS 4675, ASME SB164-B, ASTM B127, DIN2.4375, EN60, FM60, IN60, Hastelloy, Monel, K500, UNS NO4400, Inconel 600, Colmonoy Nr.6);
(viii) alloys with more than 25 per cent nickel and 20 per cent chromium and/or copper by weight - (some examples: Alloy 825, Cunifer 30Cr, EniCu-7, IN 732 X, Inconel 800, Monel 67, Monel WE 187, Nicrofer 3033, UNS C71900);
(ix) graphite or carbon/graphite (a composite consisting of amorphous carbon and graphite in which the graphite content is 8 per cent or more by weight);
(x) fluoropolymers - (some examples: Aclar, Aflex COP, Aflon COP 88, F 40, Flurorex, Ftorlon, Ftoroplast, Neoflon, ETFE, Teflon, Tetzel, PVDF, PVF_2, PFA, PTFE, PE TFE 500 LZ, Halar, Viton A);
(xi) silver.

Revised Appendix To Annex III of the Plan for ongoing monitoring and verification.

Items to be notified under the Export / Import Mechanism approved by SCR1051

Provisions related to Biological Items

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1. Microorganisms, other organisms, toxins or genetic material, as specified in List 1 (Explanatory Note, see attached).

Microorganisms means bacteria (including mycoplasma, and rickettsiae), viruses, or fungi, whether natural, enhanced or modified, either in the form of isolated live cultures, including live cultures in dormant form or in dried preparations, or as material including living material which has been deliberately inoculated or contaminated with such cultures.

Toxins include purified or crude material.

2.1 (Commodity Designator Code: BA002100)

Facilities, rooms or other enclosures that meet the physical containment criteria for P3 or P4 (BL3, BL4, L3, L4) biological containment as specified in the WHO Laboratory Biosafety Manual (Geneva, 1993).

2.2 (Commodity Designator Code: BA002200)

Biological safety cabinets, which allow manual operations to be performed within, whilst providing an equivalent to Class I, II or III biological protection, as specified in the WHO Laboratory Biosafety Manual (Geneva, 1993) as follows:

Class I cabinet: an open-fronted, ventilated cabinet for personal protection with an unrecirculated inward air flow away from the operator. It is fitted with a HEPA filter to protect the environment from a discharge of microorganisms;

Class II cabinet: an open-fronted, ventilated cabinet for personal, product and environmental protection, which provides an inward air flow and HEPA-filtered supply and exhaust air. There are two main variations: the Class IIA type recirculates 70 per cent of the air; the Class IIB type recirculates 30 percent of the air; and

Class III cabinet: a totally enclosed ventilated cabinet, which is gas-tight and is maintained under negative air pressure. The supply air is HEPA-filtered and the exhaust air is passed through two HEPA filters in series. Work is performed with attached long-sleeved gloves.

Kits to upgrade Class I biosafety cabinets to Class II or III.

Specially designed long sleeved gloves for Class III biosafety cabinet.

2.3 (Commodity Designator Code: BA002300)

Flexible film isolators, glove boxes, anaerobic chambers, dry boxes and secondary containment systems using HEPA air filtration, and having access ports for control, manipulation and decontamination.

2.4 (Commodity Designator Code: BA002400)

HEPA filters of a frame area of 0.0625 m^2 or greater and which have a DOP rating of 99.997 % (at 0.3 micron) or higher.

2.5 (Commodity Designator Code: BA002500)

Autoclaves designed to sterilize infectious material, with an internal volume equal to 1.0 m^3 or greater.

2.6 (Commodity Designator Code: BA002600)

Positive pressure air-fed suits, half suits, helmets and respirators designed for biological use.

3.1 (Commodity Designator Code: BA003100)

Fermenters, bioreactors, chemostats, and continuous flow fermentation systems with a vessel capacity of 50 litres or more and the following specially designed components:

top plates;
vessels;
pH probes; and
pO_2 probes.

3.2 (Commodity Designator Code: BA003200)

Specially designed tissue culture cultivation vessels in which each vessel has an effective growth surface area of 450cm^2 or greater.

3.3 (Commodity Designator Code: BA003300)

Orbital or reciprocal shakers with a total flask capacity greater than 250 litres, designed for use with biological material.

Shaking incubators with a total flask capacity greater than 250 litres, designed for use with biological material.

4.1 (Commodity Designator Code: BA004100)

Centrifugal separators (or decanters) designed for use with biological material capable of continuous operation at a flow rate of 50 litres per hour or greater and specially designed rotors therefor.

4.2 (Commodity Designator Code: BA004200)

Batch centrifuges with a rotor capacity of 25 litres or greater, designed for use with biological material.

4.3 (Commodity Designator Code: BA004300)

Cross-flow and tangential filtration equipment designed for use with biological material with a filter area equal to or greater than 2m^2 and component filter cartridges therefor.

4.4 (Commodity Designator Code: BA004400)

Spray drying equipment designed for use with biological material and the following specially designed components:

Spray/atomiser unit;
Cyclones;
Classifiers; and
Electronic control units.

4.5 (Commodity Designator Code: BA004500)

Freeze-drying (lyophilisation) equipment with a condenser capacity greater than 5 kg of ice in 24 hours, and specially designed vacuum chambers therefor.

4.6 (Commodity Designator Code: BA004600)

Size reduction equipment (including milling and grinding equipment) capable of producing powders with a mean particle size of 15 microns or less, and the following specially designed components:

Grinding head;
Milling head;
Milling body;
Grinder; and
Classifier.

5. (Commodity Designator Code: BA005000)

Formulated powdered complex growth media prepackaged in a container size of 5 Kg or greater.

Formulated concentrated liquid complex growth media prepackaged in a container size of 5 litres or greater.

Microbiological grade yeast extract when prepackaged in a container size of 5 Kg or greater.

6.1 (Commodity Designator Code: BA006100)

Immunological assay systems for microorganisms, toxins, or genetic material in List 1, with specially designed reagents.

6.2 (Commodity Designator Code: BA006200)

Gene probe assay systems for micro-organisms, toxins, or genetic material in List 1, with specially designed reagents.

6.3 (Commodity Designator Code: BA006300)

Biological agent detection systems for microorganisms, toxins, or genetic material in List 1, designed for biological defense or civil defense applications.

6.4 (Commodity Designator Code: BA006400)

Nucleic acid sequencing equipment.

6.5 (Commodity Designator Code: BA006500)

Nucleic acid synthesizers.

6.6 (Commodity Designator Code: BA006600)

Electroporation or biolistics equipment.

6.7 (Commodity Designator Code: BA006700)

Thermal cyclers designed for use in molecular biology.

7.1 (Commodity Designator Code: BA007100)

Aircraft sprayers capable of dispersing aerosols with an ultimate mean size of 15 microns or less at a flow rate exceeding 1 litre of liquid suspension per minute or 10 g of dry material per minute, and the following specially designed components:

spray tanks;
certified pumps; and
spray nozzles.

7.2 (Commodity Designator Code: BA007200)

Aerosol disseminators (other than aircraft sprayers and foggers), capable of dispersing aerosols with an ultimate mean size of 15 microns or less at a flow rate exceeding 1 litre of liquid suspension per minute or 10 g of dry material per minute.

Note: This entry excludes dry powder fire extinguishers.

7.3 (Commodity Designator Code: BA007300)

Foggers including pulse jet disseminators capable of dispersing aerosols with an ultimate mean size of 15 microns or less at a flow rate exceeding 1 litre of liquid suspension per minute or 10 g of dry material per minute, and the following specially designed components:

head unit; and
nozzle assembly.

8.1 (Commodity Designator Code: BA008100)

Aerosolization drums, cabinets, chambers, rooms or other enclosures usable in the study of aerosols.

8.2 (Commodity Designator Code: BA008200)

Nose–only aerosolisation equipment but excluding devices for personal prophylaxis or therapy for medical conditions.

8.3 (Commodity Designator Code: BA008300)

Aerodynamic particle-sizing equipment.

9. (Commodity Designator Code: BA009000)

Vaccines to microorganisms or toxins described in List 1 (excluding subcategories 1.4, 1.5, and 1.6) for use with humans and animals except for the following entries:

Shigella dysenteriae
Foot and mouth disease virus
Lyssa virus
Newcastle disease virus
Peste des petits ruminants virus
Rinderpest virus
Yellow fever virus

Note: Vaccines containing viable microorganisms included in List 1 are notifiable under the List 1 entry.

10. (Commodity Designator Code: BA010000)

Documents, information, software or technology for the design, development, use, storage, manufacture, maintenance or support of entries 1 to 9 above, excluding that in the public domain, published basic scientific research or the minimum necessary for the use of the goods detailed in entries 1 to 9.

NOTE : "Document" means blueprints, plans, diagrams, models, formulae, tables, engineering designs or specifications, manuals or instructions, pertaining to micro-organisms, toxins and genetic material except those containing information generally available to the public.

1 June 2001

Explanatory Note

LIST 1 - Microorganisms, Viruses and Toxins Subject to Notification under the Export/Import Monitoring Mechanism

1.1 Microorganisms

Entry Number	Name	Other Names	Commodity Designator Code
1.1.1	Bacillus anthracis		BA001101
1.1.2	Bacillus cereus		BA001102
1.1.3	Bacillus licheniformis		BA001103
1.1.4	Bacillus megaterium		BA001104
1.1.5	Bacillus pumilis		BA001105
1.1.6	Bacillus subtilis		BA001106
1.1.7	Bacillus thuringensis		BA001107
1.1.8	Bartonella quintana,	Rochalimaea quintana, Rickettsia quintana	BA001108
1.1.9	Brucella abortus		BA001109
1.1.10	Brucella melitensis		BA001110
1.1.11	Brucella suis		BA001111
1.1.12	Burkholderia mallei	Pseudomonas mallei	BA001112
1.1.13	Burkholderia pseudomallei	Pseudomonas pseudomallei	BA001113
1.1.14	Chlamydia psittaci		BA001114
1.1.15	Clostridium botulinum		BA001115
1.1.16	Clostridium perfringens		BA001116
1.1.17	Coxiella burnetii		BA001117
1.1.18	Erwinia amylovora		BA001118
1.1.19	Escherichia coli O157:H7		BA001119
1.1.20	Francisella tularensis		BA001120
1.1.21	Mycoplasma mycoides		BA001121
1.1.22	Ralstonia solanacearum		BA001122
1.1.23	Rickettsia prowazekii		BA001123
1.1.24	Rickettsia rickettsii		BA001124
1.1.25	Salmonella typhi	Salmonella enterica var typhi	BA001125
1.1.26	Serratia marcescens		BA001126
1.1.27	Shigella dysenteriae		BA001127
1.1.28	Staphylococcus aureus		BA001128
1.1.29	Vibrio cholerae		BA001129
1.1.30	Xanthomonas albilineans		BA001130
1.1.31	Xanthomonas campestris pv. citri	Xanthomonas campestris pv. citri types A, B, C, D, E; Xanthomonas citri; Xanthomonas campestris pv. aurantifolia; Xanthomonas campestris pv. Citrumelo	BA001131
1.1.32	Yersinia pestis	Yersinia pseudotuberculosis var pestis	BA001132

1.2 Viruses

Entry Number	Name	Other Names	Commodity Designator Code
1.2.1	African horse sickness virus		BA001201
1.2.2	African swine fever virus		BA001202
1.2.3	Avian influenza virus	Fowl plague virus	BA001203
1.2.4	Blue tongue virus		BA001204
1.2.5	Camel pox		BA001205
1.2.6	Chikungunya virus		BA001206
1.2.7	Congo-Crimean haemorrhagic fever virus		BA001207
1.2.8	Dengue fever virus		BA001208
1.2.9	Eastern equine encephalitis virus		BA001209
1.2.10	Ebola virus		BA001210
1.2.11	Enterovirus 70		BA001211
1.2.12	Foot and mouth disease virus		BA001212
1.2.13	Goat pox virus		BA001213
1.2.14	Hantaan virus		BA001214
1.2.15	Human influenza virus		BA001215
1.2.16	Infectious haemorrhagic conjunctivitis virus		BA001216
1.2.17	Japanese encephalitis virus		BA001217
1.2.18	Junin virus		BA001218
1.2.19	Kyasanus Forest virus		BA001219
1.2.20	Lassa fever virus		BA001220
1.2.21	Louping ill virus		BA001221
1.2.22	Lymphocytic choriomeningitis virus		BA001222
1.2.23	Lyssa virus	Rabies virus	BA001223
1.2.24	Machupo virus		BA001224
1.2.25	Marburg virus		BA001225
1.2.26	Monkey pox virus		BA001226
1.2.27	Murray Valley encephalitis virus		BA001227
1.2.28	Newcastle disease virus		BA001228
1.2.29	Nipah virus		BA001229
1.2.30	Oropouche virus		BA001230
1.2.31	Peste des petits ruminants virus		BA001231
1.2.32	Porcine herpes virus	Aujeszky's disease virus	BA001232
1.2.33	Powarsan virus		BA001233
1.2.34	Rift Valley fever virus		BA001234
1.2.35	Rinderpest virus		BA001235
1.2.36	Rocia virus		BA001236
1.2.37	Rotaviruses		BA001237
1.2.38	Sheep pox virus		BA001238
1.2.39	Sin Nombre virus		BA001239
1.2.40	St. Louis encephalitis virus		BA001240
1.2.41	Sugar cane Fiji disease virus		BA001241
1.2.42	Swine fever virus	Hog cholera virus	BA001242
1.2.43	Swine influenza virus		BA001243
1.2.44	Swine vesicular disease	Porcine enterovirus type 9	BA001244
1.2.45	Teschen disease virus		BA001245
1.2.46	Tick-borne encephalitis virus	Russian Spring-Summer encephalitis virus	BA001246
1.2.47	Variola virus(es)	Smallpox virus	BA001247
1.2.48	Venezuelan equine encephalitis virus		BA001248
1.2.49	Vesicular stomatitis virus		BA001249
1.2.50	Western equine encephalitis virus		BA001250
1.2.51	White pox virus		BA001251
1.2.52	Yellow fever virus		BA001252

1.3 Toxins

Entry Number	Name	Other Names	Commodity Designator Code
1.3.1	Abrin(s)		BA001301
1.3.2	Aflatoxin(s)		BA001302
1.3.3	Botulinum toxin(s)		BA001303
1.3.4	Bungarotoxin(s)		BA001304
1.3.5	Ciguatoxin(s)		BA001305
1.3.6	Clostridium perfringens toxin(s)		BA001306
1.3.7	Conotoxin(s)		BA001307
1.3.8	Microcystin(s)	Yanoginosins; Cyanginosin	BA001308
1.3.9	Modeccin(s)		BA001309
1.3.10	Pseudomonas exotoxin(s)		BA001310
1.3.11	Ricin(s) [CAS No.9009-86-3]	Ricins, Ricine	BA001311
1.3.12	Saxitoxin(s) [CAS No. 35523-89-8]	1H,10H-Pyrrolo[1,2-c]purine-10,10-diol, 2,6-diamino-4-[[(aminocarbonyl)oxy]methyl]-3a,4,8,9-tetrahydro-,[3aS-(3a.a,4a,10aR*)]-, Saxitoxin hydrate, Mussel poison, Clam poison, Paralytic shellfish poison, Gonyaulax toxin, STX.	BA001312
1.3.13	Shiga toxin(s)		BA001313
1.3.14	Staphylococcus enterotoxin(s)	Staphylococcus aureus enterioxin Staphylococcus aureus toxin	BA001314
1.3.15	Tetrodotoxin(s)		BA001315
1.3.16	Trichothecene toxin(s)		BA001316
1.3.17	Verotoxin(s)		BA001317
1.3.18	Volkensin(s)		BA001318

1.4 Fungi

Entry Number	Name	Other Names	Commodity Designator Code
1.4.1	Aspergillus flavus		BA001401
1.4.2	Aspergillus nidans		BA001402
1.4.3	Cochliobolus miyabeanus	Helminthosporium oryzae	BA001403
1.4.4	Colletotrichum coffeanum var. virulans		BA001404
1.4.5	Dothistroma pini	Scirrhia pini	BA001405
1.4.6	Fusarium oxysporum		BA001406
1.4.7	Magnaporthe grisea	Pyricularia grisea, Pyricularia oryzae	BA001407
1.4.8	Microcyclus ulei	Dothidella ulei	BA001408
1.4.9	Peronospora hyoscyami de Bary f.sp. tabacina skalicky	Peronospora hyoscyami de Bary f.sp. Adam skalicky	BA001409
1.4.10	Puccinia graminis	Puccinia graminis f. sp. Tritici	BA001410
1.4.11	Puccinia striiformis	Puccinia glumarum	BA001411
1.4.12	Tilletia carnis		BA001412
1.4.13	Tilletia foetida		BA001413
1.4.14	Tilletia indica		BA001414

1.5 Other Organisms

Entry Number	Name	Other Names	Commodity Designator Code
1.5.1	Eukaryotic (non-microbial) organism which produce any listed toxins		BA001501

1.6 Genetically Modified Organisms

Entry Number	Name	Other Names	Commodity Designator Code
1.6.1	Genetically modified microorganisms listed above.		BA001601
1.6.2	Genetically modified microorganisms or genetic material containing nucleic acid sequences derived from any of the listed microorganisms, above or that contain nucleic acid sequences associated with pathogenicity determinants of any listed microorganism; or that contain nucleic acid sequences associated with any listed toxin.		BA001602
1.6.3	Genetically modified variants of eukaryotic (non-microbial) organisms which produce any listed toxin.		BA001603

Revised Annex IV of the Plan for Ongoing Monitoring and Verification

Items to be Notified Under the Export/Import Mechanism approved by SCR 1051

Provisions related to Missile items

A. Prohibited Items.

The prohibitions under the Plan (S/22871 Rev. 1 of 20 Oct 1991) apply to any ballistic missiles or missile delivery systems (referred as "missile systems") capable of a range greater than 150 kilometres regardless of payload, and to any related major parts, including surface-to-surface missiles, space launch vehicles, sounding rockets, cruise missiles, target drones, reconnaissance drones, and other unmanned air vehicle systems and such other items as are identified below as being prohibited.

B. Dual Use Items.

The following list contains equipment, other items and technologies capable of being used in the development, production, construction, modification or acquisition of missile systems capable of a range greater than 150 kilometers and shall therefore, in accordance with paragraph 40 of the Plan (S/22871 Rev. 1 20 Oct 1991), be subject to ongoing monitoring and verification.

1 (Commodity Designator code: MA010000)

Complete subsystems designed or modified for missile systems, and technologies, production facilities, and production equipment therefore, as follows:

Note: Re-entry vehicles and equipment designed or modified therefor, are prohibited.

1.1 (Commodity Designator code: MA011000)

Individual rocket stages

1.1.1 (Commodity Designator code: MA011100)

Solid- or liquid-propellant rocket engines

1.1.2 (Commodity Designator code: MA011200)

Ramjet/scramjet/pulse jet/combined cycle engines, including devices to regulate combustion, and components therefor

1.1.3 (Commodity Designator code: MA011300)

Hybrid rocket motors and components therefor

1.2 (Commodity Designator code: MA012000)

Guidance sets

1.3 (Commodity Designator code: None)

Thrust vector controls, as follows;

1.3.1 (Commodity Designator code: MA013100)

Flexible nozzles

1.3.2 (Commodity Designator code: MA013200)

Fluid or secondary gas injection systems

1.3.3 (Commodity Designator code: MA013300)

Movable engines or nozzles

1.3.4 (Commodity Designator code: None)

Deflection systems of the exhaust gas stream as follows:

1.3.4.1 (Commodity Designator code: MA013410)

Jet vanes

1.3.4.2 (Commodity Designator code: MA013420)

Probes

1.3.4.3 (Commodity Designator code: MA013430)

Jet avator

1.3.4.4 (Commodity Designator code: MA013430)

Thrust tabs

1.4 (Commodity Designator code: MA014000)

Warhead or weapon safing, arming, fuzing and firing mechanisms

2 (Commodity Designator code: None)

Propulsion components and equipment, including components, equipment, propellant and constituent chemicals for propellants usable in missile systems and technology, production facilities and production equipment, as follows:

2.1 (Commodity Designator code: MA021000)

Rocket-motor cases and production equipment therefor including interior lining, insulation and nozzles, and the technology, the production facilities and production equipment therefor; engines, including devices to regulate combustion, and components therefor.

2.2 (Commodity Designator code: MA022000)

Lightweight turbojet, turbofan and turbocompound engines that are small and fuel efficient, as follows:

a. Engines with both of the following characteristics:

i. Maximum thrust greater than 400N (achieved un-installed) excluding civil certified engines with a maximum thrust greater than 8,890N (achieved un-installed), and

ii. Specific fuel consumption of 0.15kg/N/hr or less (at sea level static and standard conditions); or

b. Engines designed or modified for missile systems, regardless of thrust or specific fuel consumption.

2.3 (Commodity Designator code: MA023000)

Production equipment also covers shear forming, and flow-forming machines, including machines combining the function of spin-forming and flow-forming, including components and software therefore, as follows:

a. Which, according to the manufacturer's technical specification, are capable of being equipped with numerical control units or a computer control, even when not equipped with such units at delivery, and

b. With more than two axes which are capable of being coordinated simultaneously for contouring control.

2.4 (Commodity Designator code: MA024000)

Staging, clustering, and separation mechanisms, and the technology, production facilities and production equipment therefore.

2.5 (Commodity Designator code: MA025000)

Liquid-propellant control systems and components therefore, including liquid and slurry propellant control systems, and components therefor, designed or modified to operate in vibration environments of more than 5 g RMS between 20 Hz and 2,000 Hz, and the technology, the production facilities and production equipment therefor and also including:

2.5.1 (Commodity Designator code: MA025100)

Servo valves designed for flow rates of 5 litres per minute or greater, at an absolute pressure of 4,000 kPa (600 psi) or greater, with an actuator response time of less than 100 msec;

Note: Servo valves designed for flow rates of 24 litres per minute or greater, at an absolute pressure of 7,000 kPa (1,000 psi) or greater, with an actuator response time of less than 100 msec are prohibited.

2.5.2 (Commodity Designator code: MA025200)

Pumps, for liquid propellants, with shaft speeds equal to or greater than 6,000 RPM or with discharge pressures equal to or greater than 4,000 kPa (600 psi) or with a flow rate of 200 litres per minute or greater at atmospheric pressure.

Note: Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 RPM or with discharge pressures equal to or greater than 7,000 kPa (1,000 psi) or 450 litres per minute or greater at standard atmospheric pressure are prohibited.

3 (Commodity Designator code: None)

Propellants and constituent chemicals for propellants, as follows:

3.1 (Commodity Designator code: None)

Propulsive substances:

3.1.1 (Commodity Designator code: MA031100)

Hydrazine with a concentration of more than 70 percent and its derivatives, as follows:

Monomethylhydrazine (MMH); hydrazine hydrate (also known as hydrazine monohydrate), diamine hydrate, and hydrazine aqueous.

3.1.2 (Commodity Designator code: MA031200)

Unsymmetric dimethylhydrazine; (UDMH)

3.1.3 (Commodity Designator code: MA031300)

Organic azides: diazidodecane, diazidohexane

3.2 (Commodity Designator code: MA032000)

Ammonium perchlorate and other solid oxidizers as follows:

Ammonium dinitramide (ADN), compounds of nitroform, dinitramides, nitramines, nitrocubanes

3.3 (Commodity Designator code: MA033000)

Spherical aluminium powder with particles of uniform diameter of less than 500 x 10^{-6}m (500 microns) and an aluminium content of 97 percent by weight or greater;

3.3.1 (Commodity Designator code: MA033100)

Metal fuels in particle sizes less than 500 x 10^{-6} m (500 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent by weight or more of any of the following: zirconium*, beryllium, boron**, magnesium, and alloys of these.

*The natural content of hafnium in the zirconium (typically 2 percent to 7 percent) is counted with the zirconium.

** The threshold for boron is at 85 percent by weight or higher.

3.3.2 (Commodity Designator code: MA033200)

Nitramines, Cyclotetramethylenetetranitramine (HMX), Cyclotrimethylenetrinitramine (RDX)

3.3.3 **(Commodity Designator code: MA033300)**

Perchlorates, chlorates or chromates mixed with high energy fuel components such as powdered metals

3.3.4 **(Commodity Designator code: MA033400)**

Carboranes, decaboranes, pentaboranes and derivatives thereof.

3.3.5 **(Commodity Designator code: None)**

Liquid oxidizers, as follows:

3.3.5.1 **(Commodity Designator code: MA033510)**

Dinitrogen Trioxide

3.3.5.2 **(Commodity Designator code: MA033520)**

Nitrogen dioxide/ dinitrogen tetroxide

3.3.5.3 **(Commodity Designator code: MA033530)**

Dinitrogen pentoxide

3.3.5.4 **(Commodity Designator code: MA033540)**

Inhibited Red Fuming Nitric Acid (IRFNA)

3.3.5.5 **(Commodity Designator code: MA033550)**

Hydrogen peroxide with a concentration greater than 70 percent.

3.3.5.6 **(Commodity Designator code: MA033560)**

Compounds composed of fluorine and one or more of other halogens, oxygen or nitrogen.

3.3.6 **(Commodity Designator code: None)**

Polymeric substances as follows:

3.3.6.1 **(Commodity Designator code: MA033610)**

Carboxyl-terminated polybutadiene (CTPB)

3.3.6.2 **(Commodity Designator code: MA033620)**

Hydroxyl-terminated polybutadiene (HTPB)

3.3.6.3 **(Commodity Designator code: MA033630)**

Glycidyl azide polymer (GAP)

3.3.6.4 **(Commodity Designator code: MA033640)**

Polybutadiene-Acrylic Acid (PBAA)

3.3.6.5 **(Commodity Designator code: MA033650)**

Polybutadiene-acrylic acid-acryloNitrile (PBAN)

3.3.6.6 **(Commodity Designator code: MA033660)**

Oxetanes as follows:

Polymers of Nitratomethyl Methyl Oxetane (NIMMO), 3, 3 Bis-(Azido Methyl Oxetane) (BAMO), Azido Methyl Methyl Oxetane (AMMO)

3.3.6.7 **(Commodity Designator code: MA033670)**

Composite propellants including case-bonded propellants and propellants with nitrated binders

3.3.6.7.1 **(Commodity Designator code: MA033671)**

Noncomposite propellants including double-base propellants

3.3.6.7.2 **(Commodity Designator code: MA033672)**

Other high-energy-density propellants, with an energy density of 40 x 10^6 joules/kg or greater, e.g. boron slurry

3.4 **(Commodity Designator code: None)**

Other propellant additives and agents:

3.4.1 **(Commodity Designator code: None)**

Bonding and linking agents as follows:

3.4.1.1 **(Commodity Designator code: MA034110)**

Tris(1-(2-methyl) aziridinyl) phosphine oxide (MAPO)

3.4.1.2 **(Commodity Designator code: MA034120)**

Trimesol-1(2-ethyl) aziridine (HX-868, BITA)

3.4.1.3 **(Commodity Designator code: MA034130)**

Tepanol (HX-878), (reaction product of tetraethylenepentamine, acrylonitrile and glycidol)

3.4.1.4 **(Commodity Designator code: MA034140)**

Tepan (HX-879), (reaction product of tetraethylenepentamine with acrylonitrile)

3.4.1.5 **(Commodity Designator code: MA034150)**

Polyfunctional aziridene amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone with a 2-methyl or 2-ethyl aziridine group (HX-752, H-874 and (HX-877).

3.4.2 **(Commodity Designator code: MA034200)**

Catalysts and cross linking agents as follows:
isophorone diisocyanate, hexamethyl diisocyanide, dimeryl diisocyanate, trimethylol propane; and

3.4.2.1 **(Commodity Designator code: MA034210)**

Triphenyl Bismuth (TPB);

3.4.3 **(Commodity Designator code: None)**

Burning rate modifiers as follows:

3.4.3.1 **(Commodity Designator code: MA034310)**

Catocene

3.4.3.2 **(Commodity Designator code: MA034320)**

N-butyl ferrocene

3.4.3.3 **(Commodity Designator code: MA034330)**

Butacene

3.4.3.4 **(Commodity Designator code: MA034340)**

Any other ferrocene derivatives

3.4.4 **(Commodity Designator code: None)**

Nitrate esters and nitratoplasticizers as follows:

3.4.4.1 **(Commodity Designator code: MA034410)**

Triethylene glycol dinitrate (TEGDN)

3.4.4.2 **(Commodity Designator code: MA034420)**

Trimethylolethane trinitrate (TMETN)

3.4.4.3 **(Commodity Designator code: MA034430)**

1, 2, 4-butanetriol trinitrate (BTTN)

3.4.4.4 **(Commodity Designator code: MA034440)**

Diethylene glycol dinitrate (DEGDN)

3.4.5 **(Commodity Designator code: None)**

Stabilizers as follows:

3.4.5.1 **(Commodity Designator code: MA034510)**

2-nitrodiphenylamine (also known as 2-NDPA), phenylnaphthylamine

3.4.5.2 **(Commodity Designator code: MA034520)**

N-methyl-p-nitroaniline (MNA)

4 **(Commodity Designator code: None)**

Production technology or production equipment for missile propellants and propellant constituents and specially designed components therefor, as follows:

4.1 **(Commodity Designator code: MA041000)**

Production technology and production equipment for the handling or acceptance testing of liquid propellants or propellant constituents described in item 3.

4.2 **(Commodity Designator code: MA042000)**

Production, handling, mixing, curing, casting, pressing, machining, extruding or acceptance testing of solid propellants or propellant constituents described in item 3, including:

4.2.1 **(Commodity Designator code: MA042100)**

Batch mixers, with all of the following characteristics:

a. Capable of mixing under vacuum in the range of zero to 13.326 kPa (1.933 psi); and

b. Capable of controlling the temperature of the mixing chamber;

c. With a total volumetric capacity of 110 litres or more;

d. With at least one mixing/kneading shaft mounted off-centre

Specially designed components for the above batch mixers as follows:

Planetary drive systems,
spare blades, and
spare bowls.

Note: Such batch mixers with a total volumetric capacity of more than 210 litres are prohibited.
Note: Continuous mixers with the same pressure and temperature characteristics as item 4.2.1 and with two or more mixing/kneading shafts and capacity to open the mixing chamber are also prohibited.

4.2.2 (Commodity Designator code: MA042200)

Equipment for the production of atomized or spherical metallic powder less than 500 x 10^{-6} m (500 microns) in a controlled environment as follows;

a. Plasma generators (high frequency arc-jet) usable for obtaining sputtered or spherical metallic powders with organization of the process in an argon-water environment;

b. Electroburst equipment usable for obtaining sputtered or spherical metallic powders with organization of the process in an argon-water environment;

c. Equipment usable for the "production" of spherical aluminium powders by powdering a melt in an inert medium (e.g. nitrogen).

4.2.3 (Commodity Designator code: MA042300)

Fluid energy mills usable for grinding or milling ammonium perchlorate, RDX or HMX and ammonium perchlorate hammer and pin mills.

4.2.4 (Commodity Designator code: MA042400)

Dryers designed for the drying of ammonium perchlorate or other energetic materials. This includes both batch and continuous drying systems.

5 (Commodity Designator code: None)

Guidance and control equipment, flight control systems, and avionics equipment, as follows:

5.1 (Commodity Designator code: MA051000)

Gyroscopes, accelerometers and other inertial equipment, including instrumentation, navigation and direction finding equipment and systems, and production and test equipment therefor, as follows, and components and software therefor:

Note: Continuous output accelerometers or gyros of any type, designed to function at acceleration levels greater than 100 g, are prohibited.

5.1.1 (Commodity Designator code: MA051100)

Integrated flight instrument systems, including gyrostabilizers or automatic pilots and integration software therefor, usable in missile systems.

5.1.2 (Commodity Designator code: MA051200)

Gyro-astro compasses and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites.

5.2 (Commodity Designator code: MA052000)

Accelerometers with a threshold of 0.5 g or less, or a linearity error of less than 0.25 percent of full scale output, or both, designed for use in inertial navigation systems or in guidance systems of all types except those specially designed and developed as MWD (Measurement While Drilling) Sensors for use in downhole well service operations;

5.3 (Commodity Designator code: MA053000)

All types of gyros usable in missile systems, with a rated drift rate stability of less than 5 degrees (1 sigma or rms) per hour in a 1 g environment.

5.3.1 (Commodity Designator code: MA053100)

Inertial or other equipment using;

a. accelerometers with a threshold of 0.5 g or less, or a linearity error of less than 0.25 percent of full scale output, or both, designed for use in inertial navigation systems or in guidance systems of all types, except those specially designed and developed as MWD (Measurement While Drilling) Sensors for use in downhole well service operations; or

b. gyros with a rated drift rate stability of less than 5 degrees (1 sigma or rms) per hour in a 1 g environment; and systems incorporating such equipment, and integration software therefor.

5.4 (Commodity Designator code: MA054000)

Test, calibration, alignment, and production equipment as follows; for items specified in Integrated flight instrument systems, including gyrostabilizers or automatic pilots and integration software therefor, usable in missile systems; and inertial or other equipment using;

a. accelerometers with a threshold of 0.5 g or less, or a linearity error of less than 0.25 percent of full scale output, or both, designed for use in inertial navigation systems or in guidance systems of all types except those specially designed and developed as MWD (Measurement While Drilling) sensors for use in downhole well service operations; or

b. gyros described by a rated drift rate stability of less than 5 degrees (1 sigma or rms) per hour in a 1 g environment; and systems incorporating such equipment, and integration software.

5.4.1 (Commodity Designator code: MA054100)

For laser gyro equipment, the following equipment used to characterize mirrors, with the threshold accuracy shown or better.

5.4.2 (Commodity Designator code: MA054200)

Scatterometer (10 ppm)

5.4.3 (Commodity Designator code: MA054300)

Reflectometer (50 ppm)

5.4.4 (Commodity Designator code: MA054400)

Profilometer (5 Angstroms)

5.5 (Commodity Designator code: None)

Other inertial equipment;

5.5.1 (Commodity Designator code: MA055100)

Inertial Measurement Unit (IMU) Module Tester

5.5.1.1 (Commodity Designator code: MA055110)

IMU Platform Tester

5.5.1.2 (Commodity Designator code: MA055120)

IMU Stable Element Handling Fixture

5.5.1.3 (Commodity Designator code: MA055130)

IMU Platform Balance fixture

5.5.2 (Commodity Designator code: MA055200)

Gyro Tuning Test Station

5.5.3 (Commodity Designator code: MA055300)

Gyro Dynamic Balance Station

5.5.4 (Commodity Designator code: MA055400)

Gyro Run-In/Motor Test station

5.5.5 (Commodity Designator code: MA055500)

Gyro Evacuation and Filling Station

5.5.6 (Commodity Designator code: MA055600)

Centrifuge Fixture for Gyro Bearings

5. 5.7 (Commodity Designator code: MA055700)

Accelerometer Axis Align Station

5.5.8 (Commodity Designator code: MA055800)

Accelerometer Test Station

6 (Commodity Designator code: None)

Flight control systems and technology, as follows, designed or modified for use in missile systems and the test, calibration, and alignment equipment therefor:

6.1 (Commodity Designator code: MA061000)

Hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire systems);

6.2 (Commodity Designator code: MA062000)

Attitude control equipment;

6.2.1 (Commodity Designator code: MA062100)

Design technology for integration of air vehicle fuselage, propulsion system and lifting control surfaces to optimize aerodynamic performance throughout the flight regime of an unmanned air vehicle;

6.2.1.1 (Commodity Designator code: MA062200)

Design technology for integration of flight control, guidance, and propulsion data into a flight management system for optimization of rocket system trajectory.

6.2.2 (Commodity Designator code: MA062200)

Avionics equipment, as follows:

1. Terrain contour mapping equipment;
2. Scene mapping and correlation (both digital and analog) equipment;
3. Doppler navigation radar equipment;
4. Passive interferometer equipment;
5. Imaging sensor equipment (both active and passive) technology and components, as follows, designed or modified for use in missile systems, and software therefore.

6.2.2.1 (Commodity Designator code: MA062210)

Radar and laser radar systems, including altimeters;

6.2.2.2 (Commodity Designator code: MA062220)

Passive sensors for determining bearings to specific electromagnetic sources (direction finding equipment) or terrain characteristics;

6.2.2.3 (Commodity Designator code: MA062230)

Satellite navigation systems such as GPS, Magellan, GLONASS, or Galileo, capable of providing navigation information at speeds in excess of 515 m/sec (1,000 nautical miles/hour) and at altitudes in excess of 18 km (60,000 feet); or

6.2.2.4 (Commodity Designator code: MA062240)

Satellite navigation systems designed or modified for use with missile systems.

6.2.2.5 (Commodity Designator code: MA062250)

Electronic assemblies and components designed, modified, tested, certified, or screened for military use and operation at temperatures in excess of 125° C.

6.2.3 (Commodity Designator code: MA062300)

Design technology for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from external sources, as follows:

6.2.3.1 (Commodity Designator code: MA062400)

Design technology for shielding systems;

6.2.3.2 (Commodity Designator code: MA062411)

Design technology for the configuration of hardened electrical circuits and subsystems;

6.2.4 (Commodity Designator code: MA062412)

Determination of hardening criteria for; the shielding of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from external sources, the design criteria for shielding systems, and the configuration of hardened electrical circuits and subsystems.

7 (Commodity Designator code: None)

Equipment and technology for the production of structural composites designed or modified for use in missile systems, as follows, and components, accessories and software therefor, and structural materials usable in missile systems as follows:

7.1 (Commodity Designator code: MA071000)

Filament winding machines for which the motions for positioning, wrapping and winding fibres are capable of being coordinated and programmed in three or more axes, designed to fabricate composite structures or laminates from fibrous or filamentary materials, and coordinating and programming controls;

7.1.1 (Commodity Designator code: MA071100)

Tape-laying machines for which the motions for positioning and laying tape and sheets are capable of being coordinated and programmed in two or more axes;

7.1.2 (Commodity Designator code: MA071200)

Multi-directional, multi-dimensional weaving machines or interlacing machines, including adapters and modification kits for weaving, interlacing or braiding fibres to manufacture composite structures, except textile machinery not modified for the above end uses;

7.1.3 (Commodity Designator code: None)

Equipment designed or modified for the production of fibrous or filamentary materials as follows:

7.1.3.1 (Commodity Designator code: MA071310)

Equipment for converting polymeric fibres (e.g. polyacrylonitrile, rayon or polycarbosilane) including special provision to strain the fibre during heating;

7.1.3.2 (Commodity Designator code: MA071320)

Equipment for the vapour deposition of elements or compounds on heated filament substrates; and

7.1.3.3 (Commodity Designator code: MA071330)

Equipment for the wet-spinning of refractory ceramics (such as aluminium oxide)

7.1.3.4 (Commodity Designator code: MA071340)

Equipment designed or modified for special fibre surface treatment and equipment designed or modified for producing prepregs and preforms, including:

7.1.3.4.1 Rollers;

7.1.3.4.2 Tension stretchers;

7.1.3.4.3 Coating equipment;

7.1.3.4.4 Cutting equipment; and

7.1.3.4.5 Clicker dies.

7.1.3.5 (Commodity Designator code: MA071350)

Technical data (including processing conditions) and procedures for the regulation of temperature, pressures or atmosphere in autoclaves or hydroclaves in the production of composites or partially processed composites.

7.1.3.5 (Commodity Designator code: MA071350)

Components and accessories for the equipment to produce structural composites, fibres, prepregs or preforms, as follows: moulds, mandrels, dies, fixtures and tooling for the preform pressing, curing, casting, sintering or bonding of composite structures, laminates and manufactures thereof.

8 (Commodity Designator code: None)

Structural materials designed for use in missile systems as follows:

8.1 (Commodity Designator code: MA081000)

Composite structures, laminates, and manufactures thereof, designed or modified for missile systems or the subsystems in item 2.1, and resin impregnated fibre prepregs using resins with a glass transition temperature (T_g), after cure, exceeding 145° C as determined by ASTM D4065 or national equivalents, and metal-coated fibre preforms therefor, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements with a specific tensile strength greater than 7.62×10^4 m (3×10^6 inches) and a specific modulus greater than 3.18×10^6 m (1.25×10^8 inches);

8.1.1 (Commodity Designator code: MA081100)

Resaturated pyrolized (i.e., carbon-carbon) materials designed for missile systems;

8.1.2 (Commodity Designator code: MA081200)

Fine grain recrystallized bulk graphites (with a bulk density of at least 1.72 g/cc measured at 15° C and having a particle size of 100×10^{-6}m (100 microns) or less), pyrolytic, or fibrous reinforced graphites usable for rocket nozzles and reentry vehicle nose tips;

8.1.3 (Commodity Designator code: MA081300)

Ceramic composite materials (dielectric constant less than 6 at frequencies from 100 Hz to 10,000 MHz) for use in missile radomes, and bulk machinable silicon carbide reinforced unfired ceramic usable for nose tips;

8.1.4 (Commodity Designator code: MA081400)

Tungsten, molybdenum and alloys of these metals in the form of uniform spherical or atomized particles of 500×10^{-6} m (500 microns), or less with a purity of 97 percent by weight;

8.1.5 (Commodity Designator code: MA081500)

Maraging steels (steels generally with high nickel, very low carbon content and using substitutional elements or precipitates to produce age-hardening) with an ultimate tensile strength of 1.5×10^9Pa or greater, measured at 20°C in the form of sheet, plate or tubing with a wall or plate thickness equal to or less than 5.0 mm (0.2 inch).

8.1.6 (Commodity Designator code: MA081600)

Nitrogen stabilized duplex stainless steel (N-DSS) having all of the following characteristics:

1. containing at least 18 percent by weight chromium and 4.5 - 8.0 percent by weight nickel;

2. a ferritic-austenitic microstructure (also referred to as a two-phase microstructure) of which at least 10 percent is austenite by volume (according to ASTM E-1181-87 or national equivalents); and

3. Having any of the following forms:

   a. ingots or bars having a size of 100 mm or more in each dimension;

   b. sheets having a width of 600 mm or more and a thickness of 3 mm or less;
   or

   c. tubes having an outer diameter of 600 mm or more and a wall thickness of 3 mm or less.

8.1.7 (Commodity Designator code: MA081700)

Titanium-stabilized duplex stainless steel (Ti-DSS) having all of the following characteristics:

1. containing 17.0 - 23.0 percent by weight chromium and 4.5 - 7.0 percent by weight nickel;

2. having a titanium content of greater than 0.10 percent by weight; and

3. a ferritic-austenitic microstructure (also referred to as a two-phase microstructure) of which at least 10 percent is austenite by volume (according to ASTM E-1181-87 or national equivalents); and

4. Having any of the following forms:

   a. ingots or bars having a size of 100 mm or more in each dimension;

   b. sheets having a width of 600 mm or more and a thickness of 3 mm or less; or

   c. tubes having an outer diameter of 600 mm or more and a wall thickness of 3 mm or less

8.2 (Commodity Designator code: None)

Pyrolytic deposition and densification equipment and technology as follows:

8.2.1 (Commodity Designator code: MA082100)

Technology for producing pyrolytically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,300° C to 2,900° C temperature range at pressures of 130 Pa (1 mm Hg) to 20 kPa (150 mm Hg) including technology for the composition of precursor gases, flow-rates and process control schedules and parameters;

8.2.2 (Commodity Designator code: MA082200)

Nozzles for the above processes;

8.2.3 (Commodity Designator code: MA082300)

Equipment and process controls, and software therefor, designed or modified for densification and pyrolysis of structural composites, including:

8.2.3.1 (Commodity Designator code: MA082310)

Isostatic presses with a maximum working pressure of 69 MPa (10,000 psi) or greater and designed to achieve and maintain a controlled thermal environment of 600° C or greater, and possessing a chamber cavity with an inside diameter of 254 mm (10 inches) or greater.

8.2.3.2 (Commodity Designator code: MA082320)

Chemical vapour deposition furnaces designed or modified for the densification of carbon-carbon composites.

8.3 (Commodity Designator code: None)

Launch and ground support equipment, facilities and software designed or modified for missile systems, as follows:

8.3.1 (Commodity Designator code: MA083100)

Apparatus and devices designed or modified for the handling, control, activation and launching of missile systems;

8.3.1.1 (Commodity Designator code: MA083200)

Vehicles designed or modified for the transport, handling, control, activation and launching of missile systems;

8.3.2 (Commodity Designator code: MA083300)

Gravity meters (gravimeters), gravity gradiometers, and specially designed components therefor, designed or modified for airborne or marine use, and with a static or operational accuracy of 7×10^{-6} m/sec^2 (0.7 milligal) or better, and a time to steady-state registration of two minutes or less;

8.3.3 (Commodity Designator code: MA083400)

Telemetering and telecontrol equipment usable for missile systems;

8.3.4 (Commodity Designator code: MA083500)

Precision tracking systems, as follows:

8.3.4.1 (Commodity Designator code: MA083510)

Tracking systems using a code translator or transponder installed on the missile systems and either surface or airborne references or aviation satellite navigation systems to provide real time measurements of in-flight position and velocity;

Note: Tracking systems specified in item 8.3.4.1 with a range greater than 150km are prohibited.

8.3.4.2 (Commodity Designator code: MA083520)

Range instrumentation radars including associated optical/infrared trackers and the software therefor with an angular resolution better than 3 milli-radians (0.5 mils), and a range of 30 km or greater with a range resolution better than 10 metres RMS, and a velocity resolution better than 3 metres per second; and

Note: Range instrumentation radars specified above with a range greater than 150km are prohibited.

8.3.4.3 (Commodity Designator code: MA083530)

Software with post-flight, recorded data, for the determination of vehicle position throughout its flight path.

8.4 (Commodity Designator code: None)

Analog computers, digital computers or digital differential analyzers and analog-to-digital converters, as follows:

8.4.1 (Commodity Designator code: MA084100)

Analog computers, digital computers, or digital differential analysers designed for use in missile systems, having either of the following characteristics:

8.4.1.1 (Commodity Designator code: MA084110)

Analog computers, digital computers, or digital differential analysers rated for continuous operation at temperatures from below minus 45° C to above plus 55° C; or

8.4.1.2 (Commodity Designator code: MA084120)

Analog computers, digital computers, or digital differential analysers designed as ruggedized or radiation hardened;

8.4.2 (Commodity Designator code: MA084200)

Analog-to-digital converters, designed for missile systems, with either of the following characteristics:

8.4.2.1 (Commodity Designator code: MA084210)

Designed to meet military specifications for ruggedized equipment; or,

8.4.2.2 (Commodity Designator code: MA084220)

Designed, modified, tested, certified or screened for military use, and being one of the following types:

8.4.2.3 (Commodity Designator code: MA084230)

Analog-to-digital converter microcircuits, with a resolution of 8 bits or more or which are radiation-hardened; and are rated for operation in the temperature range from below minus 45° C to above plus 125° C; and are hermetically sealed;

8.4.2.4 (Commodity Designator code: MA084240)

Electrical input type analog-to-digital converter printed circuit boards or modules, having

a. a resolution of 8 bits or more, and
b. rated for operation from below minus 45° C to above plus 55° C, and
c. which incorporate analog-to-digital converter microcircuits, with
    1. a resolution of 8 bits or more or
    2. which are radiation-hardened; and
    3. are rated for operation in the temperature range from below minus 45° C to above plus 125° C; and
    4. are hermetically sealed.

9 (Commodity Designator code: None)

Test facilities and equipment as follows, and software therefor:

9.1 (Commodity Designator code: None)

Vibration test systems and components therefor, as follows:

9.1.1 (Commodity Designator code: MA091100)

Vibration test systems using feedback or closed loop techniques and a digital controller, capable of vibrating a system at 10g RMS or more over the entire range 20 Hz to 2000 Hz and imparting forces of 25kN (5,625 lbs), measured "bare table", or greater;

9.1.1.1 (Commodity Designator code: MA085120)

Digital controllers, which use specially designed vibration test software, with a real-time bandwidth greater than 5 kHz and designed for use with vibration test systems using feedback or closed loop techniques and a digital controller, capable of vibrating a system at 10g RMS or more over the entire range 20 Hz to 2000 Hz and imparting forces of 25kN (5,625 lbs), measured "bare table", or greater;

9.1.1.2 (Commodity Designator code: MA091120)

Vibration thrusters (shaker units), with or without associated amplifiers, capable of imparting a force of 25kN (5,625 lbs), measured "bare table", or greater, and usable in vibration test systems using feedback or closed loop techniques and a digital controller, capable of vibrating a system at 10g RMS or more over the entire range 20 Hz to 2000 Hz and imparting forces of 25kN (5,625 lbs), measured "bare table", or greater;

9.1.1.3 (Commodity Designator code: MA091130)

Bump or shock test tables with or without their associated amplifiers, capable of imparting a force of at least 100g, or greater;

9.1.1.4 (Commodity Designator code: MA091140)

Test piece support structures and electronic units designed to combine multiple shaker units into a complete shaker system capable of providing an effective total force of 25kN (5,625 lbs), measured "bare table", or greater, and usable in vibration test systems using feedback or closed loop techniques and a digital controller, capable of vibrating a system at 10g RMS or more over the entire range 20 Hz to 2000 Hz and imparting forces of 25kN (5,625 lbs), measured "bare table", or greater.

9.1.2 (Commodity Designator code: MA091200)

Wind-tunnels;

9.1.3 (Commodity Designator code: MA091300)

Test benches/stands capable of handling solid or liquid propellant rockets or rocket motors of more than 10kN (2248 lbs) of thrust, or capable of simultaneously measuring the three axial thrust components;

9.1.4 (Commodity Designator code: MA091400)

Environmental chambers and anechoic chambers capable of;

a. simulating the flight conditions at altitudes of 15,000meters or greater, or
b. simulating acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 2 x 10^{-5} N per square metre) or with a rated power output of 4 kiloWatts or greater, or,
c. capable of achieving temperatures of at least minus 50° C to plus 125° C, and
d. are capable of being equipped with vibration thrusters (shaker units) or acoustic generators capable of generating vibration environments of 10 g RMS or greater between 20 Hz and 2,000 Hz imparting forces of 5kN (1124 lbs) or greater.

9.1.4.1 (Commodity Designator code: MA091410)
Accelerators except those specially designed for medical purposes, capable of delivering electromagnetic radiation produced by "Bremsstrahlung" from accelerated electrons of 2 MeV or greater, and systems containing those accelerators.

9.2 (Commodity Designator code: MA092000)

Software, or software with related specially designed hybrid (combined analogue/digital) computers, for modelling (including in particular the aerodynamic and thermodynamic analysis of the systems), simulation, or design integration of missile systems or subsystems.

9.3 (Commodity Designator code: MA093000)

Materials, devices, and software for reduced observables (e.g. radar reflectivity, ultraviolet/infrared signatures and acoustic signatures, i.e. stealth technology), for applications designed for missile systems or subsystems including:

9.3.1 (Commodity Designator code: MA093100)

Structural materials and coatings specially designed for reducing radar reflectivity by 10 dB or more;

9.3.2 (Commodity Designator code: MA093200)

Coatings, including paints, specially designed for reducing or tailoring reflectivity or emissivity in infrared or ultraviolet spectra by 10 dB or more;

9.3.3 (Commodity Designator code: MA093300)

Software or databases for analysis of signature reduction;

9.3.4 (Commodity Designator code: MA093400)

Radar cross section measurement systems.

9.4 (Commodity Designator code: None)

Material and devices for protecting missile systems against nuclear effects (e.g. Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), as follows:

9.4.1 (Commodity Designator code: MA094100)

Radiation Hardened microcircuits and detectors capable of with standing

a. a total irradiation dose of 1x10+5 rad Si; or
b. prompt dose rate of 5x10+8 rad Si/s.

9.4.2 (Commodity Designator code: MA094200)

Radomes designed to withstand a combined thermal shock greater than 100 cal/sq cm accompanied by a peak over pressure of greater than 50 kPa.